



SEQUENCE LISTING

<110> Sorge, Joseph
Hurlbut Hogrefe, Holly
Connie, Hansen

<120> Compositions and Methods Utilizing DNA Polymerases

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<140> 09/698,341

<141> 2000-10-27

<150> 60/162,600

<151> 1999-10-29

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<170> PatentIn version 3.0

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 Val Lys Arg Ala Glu Lys Val Lys Lys Lys Phe Leu Gly Arg Ser Val
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 Arg Phe Leu Arg Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr
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 Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln Leu Ser Arg Leu
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 Ile Gly Gln Gly Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu
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 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Arg Gly Gly Tyr
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 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile
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 Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp
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| | | | | | | | | | | | | | | | | | | |
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| Arg | Lys | Met | Lys | Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | Leu | Leu | Asp | 465 | 470 | 475 |
| Tyr | Arg | Gln | Arg | Ala | Ile | Lys | Ile | Leu | Ala | Asn | Ser | Tyr | Tyr | Gly | Tyr | 485 | 490 | 495 |
| Tyr | Gly | Tyr | Ala | Arg | Ala | Arg | Trp | Tyr | Cys | Arg | Glu | Cys | Ala | Glu | Ser | 500 | 505 | 510 |
| Val | Thr | Ala | Trp | Gly | Arg | Glu | Tyr | Ile | Glu | Met | Val | Ile | Arg | Glu | Leu | 515 | 520 | 525 |
| Glu | Glu | Lys | Phe | Gly | Phe | Lys | Val | Leu | Tyr | Ala | Asp | Thr | Asp | Gly | Leu | 530 | 535 | 540 |
| His | Ala | Thr | Ile | Pro | Gly | Ala | Asp | Ala | Glu | Thr | Val | Lys | Lys | Lys | Ala | 545 | 550 | 555 |
| Met | Glu | Phe | Leu | Asn | Tyr | Ile | Asn | Pro | Lys | Leu | Pro | Gly | Leu | Leu | Glu | 565 | 570 | 575 |
| Leu | Glu | Tyr | Glu | Gly | Phe | Tyr | Val | Arg | Gly | Phe | Phe | Val | Thr | Lys | Lys | 580 | 585 | 590 |
| Lys | Tyr | Ala | Val | Ile | Asp | Glu | Glu | Gly | Lys | Ile | Thr | Thr | Arg | Gly | Leu | 595 | 600 | 605 |
| Glu | Ile | Val | Arg | Arg | Asp | Trp | Ser | Glu | Ile | Ala | Lys | Glu | Thr | Gln | Ala | 610 | 615 | 620 |
| Arg | Val | Leu | Glu | Ala | Ile | Leu | Arg | His | Gly | Asp | Val | Glu | Glu | Ala | Val | 625 | 630 | 635 |
| Arg | Ile | Val | Arg | Glu | Val | Thr | Glu | Lys | Leu | Ser | Lys | Tyr | Glu | Val | Pro | 645 | 650 | 655 |
| Pro | Glu | Lys | Leu | Val | Ile | His | Glu | Gln | Ile | Thr | Arg | Glu | Leu | Lys | Asp | 660 | 665 | 670 |
| Tyr | Lys | Ala | Thr | Gly | Pro | His | Val | Ala | Ile | Ala | Lys | Arg | Leu | Ala | Ala | 675 | 680 | 685 |
| Arg | Gly | Val | Lys | Ile | Arg | Pro | Gly | Thr | Val | Ile | Ser | Tyr | Ile | Val | Leu | 690 | 695 | 700 |
| Lys | Gly | Ser | Gly | Arg | Ile | Gly | Asp | Arg | Ala | Ile | Pro | Phe | Asp | Glu | Phe | 705 | 710 | 715 |
| Asp | Pro | Thr | Lys | His | Lys | Tyr | Asp | Ala | Asp | Tyr | Tyr | Ile | Glu | Asn | Gln | 725 | 730 | 735 |
| Val | Leu | Pro | Ala | Val | Glu | Arg | Ile | Leu | Arg | Ala | Phe | Gly | Tyr | Arg | Lys | 740 | 745 | 750 |
| Glu | Asp | Leu | Arg | Tyr | Gln | Lys | Thr | Arg | Gln | Val | Gly | Leu | Gly | Ala | Trp | 755 | 760 | 765 |
| Leu | Lys | Pro | Lys | Gly | Lys | Lys | Lys | | | | | | | | | 770 | 775 | |

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| Arg | Val | Phe | Lys | Lys | Glu | Asn | Gly | Glu | Phe | Arg | Ile | Glu | Tyr | Asp | Arg | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| Glu | Phe | Glu | Pro | Tyr | Phe | Tyr | Ala | Leu | Leu | Arg | Asp | Asp | Ser | Ala | Ile | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| Glu | Glu | Ile | Lys | Lys | Ile | Thr | Ala | Glu | Arg | His | Gly | Arg | Val | Val | Lys | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| Val | Lys | Arg | Ala | Glu | Lys | Val | Lys | Lys | Lys | Phe | Leu | Gly | Arg | Ser | Val | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| Glu | Val | Trp | Val | Leu | Tyr | Phe | Thr | His | Pro | Gln | Asp | Val | Pro | Ala | Ile | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| Arg | Asp | Lys | Ile | Arg | Lys | His | Pro | Ala | Val | Ile | Asp | Ile | Tyr | Glu | Tyr | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| Asp | Ile | Pro | Phe | Ala | Lys | Arg | Tyr | Leu | Ile | Asp | Lys | Gly | Leu | Ile | Pro | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| Met | Glu | Gly | Glu | Glu | Glu | Leu | Lys | Leu | Met | Ser | Phe | Asp | Ile | Glu | Thr | |
| | 130 | | | | | 135 | | | | | | 140 | | | | |
| Leu | Tyr | His | Glu | Gly | Glu | Glu | Phe | Gly | Thr | Gly | Pro | Ile | Leu | Met | Ile | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| Ser | Tyr | Ala | Asp | Glu | Ser | Glu | Ala | Arg | Val | Ile | Thr | Trp | Lys | Lys | Ile | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| Asp | Leu | Pro | Tyr | Val | Glu | Val | Val | Ser | Thr | Glu | Lys | Glu | Met | Ile | Lys | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| Arg | Phe | Leu | Arg | Val | Val | Lys | Glu | Lys | Asp | Pro | Asp | Val | Leu | Ile | Thr | |
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| Tyr | Asn | Gly | Asp | Asn | Phe | Asp | Phe | Ala | Tyr | Leu | Lys | Lys | Arg | Cys | Glu | |
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| Lys | Leu | Gly | Val | Ser | Phe | Thr | Leu | Gly | Arg | Asp | Gly | Ser | Glu | Pro | Lys | |
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| Ile | Gln | Arg | Met | Gly | Asp | Arg | Phe | Ala | Val | Glu | Val | Lys | Gly | Arg | Val | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| His | Phe | Asp | Leu | Tyr | Pro | Val | Ile | Arg | Arg | Thr | Ile | Asn | Leu | Pro | Thr | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| Tyr | Thr | Leu | Glu | Ala | Val | Tyr | Glu | Ala | Val | Phe | Gly | Lys | Pro | Lys | Glu | |
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 Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala
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 Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg Arg Gly Gly Tyr
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 Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile
 385 390 395 400
 Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His
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 Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp
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 Glu Trp Val Ala Val Ile Glu Gly Gly Lys Leu Arg Pro Val Arg Ile
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 Gly Glu Leu Val Asp Gly Leu Met Glu Ala Ser Gly Glu Arg Val Lys
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 Leu Trp Arg Arg Gly Arg Arg Arg Phe Lys Pro Gly Asp Leu Leu Ala
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 Asn Cys Ser Ser Asn Cys Pro Arg Arg Lys Arg Pro Thr Cys His Arg

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| His | Ser | Gly | Lys | Gly | Arg | Lys | Asn | Phe | Phe | Arg | Gly | Met | Leu | Arg | Thr | | | | |
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| Leu | Arg | Trp | Ile | Phe | Gly | Glu | Glu | Lys | Thr | Gly | Gly | Arg | Pro | Gly | Ala | | | | |
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| | 690 | | | | | 695 | | | | | 700 | | | | | | | | |
| Tyr | Glu | Arg | Leu | Val | Glu | Val | Ile | Arg | Tyr | Asn | Gly | Asn | Arg | Gly | Glu | | | | |
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| Phe | Ile | Ala | Asp | Phe | Asn | Ala | Leu | Arg | Pro | Val | Leu | Arg | Leu | Met | Met | | | | |
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| | | 755 | | | | | 760 | | | | | 765 | | | | | | | |
| Gly | Tyr | Tyr | Val | Ser | Glu | Gly | Ser | Ala | Gly | Lys | Trp | Lys | Asn | Arg | Thr | | | | |
| | 770 | | | | | 775 | | | | | 780 | | | | | | | | |
| Gly | Gly | Trp | Ser | Tyr | Ser | Val | Arg | Leu | Tyr | Asn | Glu | Asp | Gly | Ser | Val | | | | |
| 785 | | | | | 790 | | | | | 795 | | | | | 800 | | | | |
| Leu | Asp | Asp | Met | Glu | Arg | Leu | Ala | Arg | Ser | Ser | Leu | Gly | Ala | Ala | Arg | | | | |
| | | | | 805 | | | | | 810 | | | | | 815 | | | | | |
| Gly | Glu | Leu | Arg | Arg | Asp | Phe | Lys | Glu | Asp | Gly | Leu | His | Asn | Leu | Arg | | | | |
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| Gly | Ala | Leu | Arg | Phe | Thr | Gly | Arg | Glu | Gln | Glu | Gly | Ser | Val | Ala | Tyr | | | | |
| | | 835 | | | | | 840 | | | | | 845 | | | | | | | |
| Leu | His | Val | Pro | Gly | Gly | Pro | Leu | Gly | Leu | Pro | Gly | Val | Leu | His | Arg | | | | |
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| Arg | Ala | Ser | Gly | Arg | Pro | Arg | Pro | Ala | Pro | Glu | Leu | Ala | Gly | Arg | Leu | | | | |
| | | | | 885 | | | | | 890 | | | | | 895 | | | | | |
| Ser | Asp | Lys | Arg | Pro | Pro | Arg | Gln | Arg | Gly | Leu | Gln | Gly | Leu | Arg | Glu | | | | |
| | | | 900 | | | | | 905 | | | | | 910 | | | | | | |
| Arg | Gly | Thr | Ala | Leu | Tyr | Arg | Val | Pro | Glu | Ala | Glu | Glu | Arg | Leu | Thr | | | | |
| | | 915 | | | | | 920 | | | | | 925 | | | | | | | |
| Tyr | Ser | His | Val | Ile | Pro | Arg | Glu | Val | Leu | Glu | Glu | Thr | Ser | Ala | Gly | | | | |
| | 930 | | | | | 935 | | | | | 940 | | | | | | | | |
| Pro | Ser | Arg | Arg | Thr | Val | Thr | Gly | Asn | Ser | Gly | Ser | Trp | Trp | Lys | Ala | | | | |
| 945 | | | | | 950 | | | | | 955 | | | | | 960 | | | | |
| Gly | Ser | Ser | Thr | Arg | Lys | Gly | Pro | Val | Gly | Ala | Gly | Ser | Ser | Thr | Gly | | | | |
| | | | | 965 | | | | | 970 | | | | | 975 | | | | | |

| | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Ile | Ser | Ser | Thr | Gly | Ser | Arg | Lys | Ser | Gly | Arg | Lys | Ala | Thr | Arg | Gly | 980 | 985 | 990 |
| Thr | Ser | Thr | Thr | Ala | Leu | Arg | Arg | Thr | Arg | Thr | Ser | Gly | Gly | Leu | Trp | 995 | 1000 | 1005 |
| Val | Pro | Leu | Arg | Ala | Gln | Xaa | Ser | Tyr | Tyr | Gly | Tyr | Tyr | Gly | Tyr | | 1010 | 1015 | 1020 |
| Ala | Arg | Ala | Arg | Trp | Tyr | Cys | Arg | Glu | Cys | Ala | Glu | Ser | Val | Thr | | 1025 | 1030 | 1035 |
| Ala | Trp | Gly | Arg | Glu | Tyr | Ile | Glu | Met | Val | Ile | Arg | Glu | Leu | Glu | | 1040 | 1045 | 1050 |
| Glu | Lys | Phe | Gly | Phe | Lys | Val | Leu | Tyr | Ala | Asp | Thr | Asp | Gly | Leu | | 1055 | 1060 | 1065 |
| His | Ala | Thr | Ile | Pro | Gly | Ala | Asp | Ala | Glu | Thr | Val | Lys | Lys | Lys | | 1070 | 1075 | 1080 |
| Ala | Met | Glu | Phe | Leu | Asn | Tyr | Ile | Asn | Pro | Lys | Leu | Pro | Gly | Leu | | 1085 | 1090 | 1095 |
| Leu | Glu | Leu | Glu | Tyr | Glu | Gly | Phe | Tyr | Val | Arg | Gly | Phe | Phe | Val | | 1100 | 1105 | 1110 |
| Thr | Lys | Lys | Lys | Tyr | Ala | Val | Ile | Asp | Glu | Glu | Gly | Lys | Ile | Thr | | 1115 | 1120 | 1125 |
| Thr | Arg | Gly | Leu | Glu | Ile | Val | Arg | Arg | Asp | Trp | Ser | Glu | Ile | Ala | | 1130 | 1135 | 1140 |
| Lys | Glu | Thr | Gln | Ala | Arg | Val | Leu | Glu | Ala | Ile | Leu | Arg | His | Gly | | 1145 | 1150 | 1155 |
| Asp | Val | Glu | Glu | Ala | Val | Arg | Ile | Val | Arg | Glu | Val | Thr | Glu | Lys | | 1160 | 1165 | 1170 |
| Leu | Ser | Lys | Tyr | Glu | Val | Pro | Pro | Glu | Lys | Leu | Val | Ile | His | Glu | | 1175 | 1180 | 1185 |
| Gln | Ile | Thr | Arg | Glu | Leu | Lys | Asp | Tyr | Lys | Ala | Thr | Gly | Pro | His | | 1190 | 1195 | 1200 |
| Val | Ala | Ile | Ala | Lys | Arg | Leu | Ala | Ala | Arg | Gly | Val | Lys | Ile | Arg | | 1205 | 1210 | 1215 |
| Pro | Gly | Thr | Val | Ile | Ser | Tyr | Ile | Val | Leu | Lys | Gly | Ser | Gly | Arg | | 1220 | 1225 | 1230 |
| Ile | Gly | Asp | Arg | Ala | Ile | Pro | Phe | Asp | Glu | Phe | Asp | Pro | Thr | Lys | | 1235 | 1240 | 1245 |
| His | Lys | Tyr | Asp | Ala | Asp | Tyr | Tyr | Ile | Glu | Asn | Gln | Val | Leu | Pro | | 1250 | 1255 | 1260 |
| Ala | Val | Glu | Arg | Ile | Leu | Arg | Ala | Phe | Gly | Tyr | Arg | Lys | Glu | Asp | | 1265 | 1270 | 1275 |
| Leu | Arg | Tyr | Gln | Lys | Thr | Arg | Gln | Val | Gly | Leu | Gly | Ala | Trp | Leu | | 1280 | 1285 | 1290 |
| Lys | Pro | Lys | Gly | Lys | Lys | Lys | | | | | | | | | | 1295 | 1300 | |

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gcaacggaat ggcgagagaa cggcgactac cccagtggaa gagcttttga aagccaaagc 300
cgagcttcag cgaatgtgcg gtgcccttgt tcaagagttg tgagcccttg attgttgttt 360
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gagaggcacg gcagggtcgt taagggttaag cgcgcgagga aggtgaagaa aaagttcctc 660
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cgcgacaaaa taaggaagca ccccgcggtc atcgacatct acgagtacga catacccttc 780
gccaaagcgt acctcataga caagggccta atcccgatgg aaggtgagga agagcttaaa 840
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cacttcgacc tttatccagt cataaggcgc accataaacc tcccgcaccta cacccttgag 1260
gctgtatacg aggcgggtttt cggcaagccc aaggagaagg tctacgccga ggagatagcc 1320
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| | |
|---|------|
| aggggttacct acgagcttgg cagggagttc ttcccgatgg agggccagct ttccaggctc | 1440 |
| atcggccaag gcctctggga cgtttcccg cccagcaccg gcaacctcgt cgagtgggtc | 1500 |
| ctcctaagga aggcctacga gaggaacgaa ctcgctccca acaagcccga cgagagggag | 1560 |
| ctggcgagga gaaggggggg ctacgccggg ggctacgtca aggagccgga ggggggactg | 1620 |
| tgggacaata tcgtgtatct agactttcgt agtctctacc cttcaatcat aatcacccac | 1680 |
| aacgtctcgc cagatacgt caaccgcgag ggggtgtagga gctacgacgt tgcccccgag | 1740 |
| gtcggtcaca agttctgcaa ggacttcccc ggcttcattc cgagcctgct cggaaacctg | 1800 |
| ctggagggaaa ggagaaagat aaagaggaag atgaaggcaa ctctcgaccc gctggagaag | 1860 |
| aatctcctcg attacaggca acgcgccatc aagattctcg caaacagcct tcttccccgg | 1920 |
| gagtgggttg cggtcattga aggggggaaa ctcaggcccc tccgcctcgg cgagctggtt | 1980 |
| gatggactga tggaagccag cggggagagg gtgaaaagag acggcgacac cgaggtcctt | 2040 |
| gaagtcgagg ggctttacgc ctctccttcg acagggagtc caagaaagcc cgcacaatgc | 2100 |
| cggtgaaaagc cgtgataagg caccgctatg ccgggggaagt ttacagaata gctctcaact | 2160 |
| ccggaaggag gattaagcgt gacgcgcggc cacagcctct tcgcgtaccg ggacgcgagc | 2220 |
| ttgtggaggt gacgggggag gaggaggttc aagcccggcg acctcctggc ggtgccaaagc | 2280 |
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| aggggaatgc tcagaaccct ccgctggatt ttcggggagg agaagaccgg agggcggcca | 2460 |
| ggcgctacct ggagcacctt gcgtgggctc ggctacgtga agctgaggaa aatcggctac | 2520 |
| ggggtgggtg atagggaggg actgggaaaag gtaccgcgct tctacgagag gctcgtggag | 2580 |
| gtaatccgct acaacggcaa caggggggag ttcacgcggc atttcaacgc gctccgcccc | 2640 |
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| gggttcagga taaggccgtt catagaggtt gattggaagt tcgcaaagct cctcggctac | 2760 |
| tacgtgagcg aggggagcgc cgggaagtgg aaaaaccgga ccgggggctg gagctactcg | 2820 |
| gtgaggcttt acaacgagga cgggagcgtt ctcgacgaca tggagagact cgcgaggagt | 2880 |
| tctttggggg cgtgagcgcg gggggaacta cgtcgagatt tcaaagaaga tggcctacat | 2940 |
| aatcttcgag gggctctgcg gttcaccggc cgagaacaag agggttccgt ggcttatctt | 3000 |
| cacgtcccct gaggaggtcc gctgggcctt ccttgagggg tacttcatcg gcgacggcga | 3060 |
| cgttcacccg agcaagatgg ttcggctctc caccaagagc gagcttcttg ctaacggcct | 3120 |
| cgtcctgctc ctgaactcgc tgggcgtctc agcgataaac gtccgccacg acagcggggg | 3180 |
| ttacagggtc tacgtgaacg aggaactgcc ctttacagag taccggaagc ggaagaacgc | 3240 |
| ctcacttact cccacgtcat accgagggaa gtgctggagg agacttcggc cgggccttcc | 3300 |
| agaagaacat gagtcacggg aaattcaggg agctggtgga aagcggggag ctcgacgcgg | 3360 |

| | | | | | | |
|-------------|-------------|------------|-------------|-------------|------------|------|
| aaagggccgg | taggataggc | tggctcctcg | acggggatat | agtcctcgac | agggctctcg | 3420 |
| aagtcaggaa | ggaaagctac | gaggggtacg | tctacgacct | gagcgttgag | gaggacgaga | 3480 |
| acttctggcg | ggctttgggt | tcctctacgc | gcacaacnna | gctactacgg | ctactacggc | 3540 |
| tatgccaggg | caagatggta | ctgcagggag | tgcgccgaga | gcgttacggc | atggggaagg | 3600 |
| gagtacatcg | aaatgggtcat | cagagagctt | gaggaaaagt | tcggtttttaa | agtcctctat | 3660 |
| gcagacacag | acggtctcca | tgccaccatt | cctggagcgg | acgctgaaac | agtcaagaaa | 3720 |
| aaggcaatgg | agttcttaaa | ctatatcaat | cccaaactgc | ccggccttct | cgaactcgaa | 3780 |
| tacgagggct | tctacgtcag | gggcttcttc | gtcacgaaga | aaaagtacgc | ggtcacgcac | 3840 |
| gaggagggca | agataaccac | gcgcgggctt | gagatagtca | ggcgcgactg | gagcgagata | 3900 |
| gcgaaggaga | cgcaggcgag | ggttttggag | gcgatactca | ggcacggtga | cgttgaagag | 3960 |
| gccgtcagaa | ttgtcagggg | agtcaccgaa | aagctgagca | agtacgaggt | tccgccggag | 4020 |
| aagctggtta | tccacgagca | gataacgcgc | gagctcaagg | actacaaggc | caccggcccc | 4080 |
| cacgtagcca | tagcgaagcg | tttggccgcc | agaggtgtta | aaatccggcc | cggaactgtg | 4140 |
| ataagctaca | tcgttctgaa | gggctccgga | aggataggcg | acagggcgat | tccttcgac | 4200 |
| gagttcgacc | cgacgaagca | caagtacgat | gcggactact | acatcgagaa | ccaggttctg | 4260 |
| ccggcagttg | agagaatcct | cagggccttc | ggctaccgca | aggaagacct | gcgctaccag | 4320 |
| aagacgaggc | aggtcgggct | tggcgcgtgg | ctgaagccga | aggggaagaa | gaagtgagga | 4380 |
| attatctggt | ttcttttccc | agcattaaat | gcttccgaca | ttgccttatt | tatgaaactc | 4440 |
| ctgttgtgcc | tgagtttgtg | ccagaaaaca | gcctgttctg | acggcgcttt | ttcttgccag | 4500 |
| gtctcttgag | tttcgcaagg | gtcttctcga | ccagctcaat | ggtcttgctg | tcattgtttt | 4560 |
| nnnnnnnnnn | nnnnnnnnnn | cccggggact | tcatactggc | ggtaatagac | agggattcct | 4620 |
| tcctcaagga | cttcccggga | ggcattggag | ttttttgggtg | gggctttcac | aggatttgct | 4680 |
| catcttggtg | atttctcggt | cgattgaatc | tgtccacttg | aggggtgtagg | tcgagacggt | 4740 |
| ggagcgcgta | ttccggggagc | gggtcttgag | gtccattttt | tcagtcctcc | tccggcgaag | 4800 |
| aagtggaaact | caagccgggt | gttagcttat | gttatgttcc | caactcctcc | agcacctcca | 4860 |
| ggatccccctc | aatcccggaa | cctcgaagcc | cctctcgtyg | atctttctaa | cttctctgct | 4920 |
| ctccggggttt | atccagaccg | cccacatgcc | ggctctcagc | gcaccctcga | aatcctccgc | 4980 |
| gtaggtgtcg | ccgatgtgga | ttgcctcgtc | cggtctgacc | ccgaagcatc | gagcggtttt | 5040 |
| ctgaacatct | cgggcatcgg | cttatacgcc | agaacctcgt | cggcgaagaa | ggttccctca | 5100 |
| atgtagtcca | tcaggccgaa | cctctcgagg | gggggccccg | tacccaattc | gccctatagt | 5160 |
| gagtcgatta | caattcactg | gccgtcgttt | tacaacgtcg | tgactgggaa | aaccctggcg | 5220 |
| ttaccaact | taagtcgctt | tgacgacat | cccc | | | 5255 |

<210> 5
<211> 8
<212> PRT
<213> Thermococcus sp. JDF-3

<220>
<221> UNSURE
<222> (2)..(3)
<223> X = unknown

<220>
<221> UNSURE
<222> (6)..(6)
<223> X = unknown

<400> 5

Lys Xaa Xaa Asn Ser Xaa Tyr Gly
1 5

<210> 6
<211> 10
<212> PRT
<213> Thermococcus sp. JDF-3

<220>
<221> UNSURE
<222> (2)..(4)
<223> unknown

<220>
<221> VARIANT
<222> (5)..(5)
<223> X = F or Y

<400> 6

Lys Xaa Xaa Xaa Xaa Gly Xaa Xaa Tyr Gly
1 5 10

<210> 7
<211> 10
<212> PRT
<213> Thermococcus sp. JDF-3

<220>
<221> UNSURE
<222> (2)..(3)
<223> X = unknown

<400> 7

Asp Xaa Xaa Ser Leu Tyr Pro Ser Ile Ile
1 5 10

<210> 8
<211> 10
<212> PRT
<213> Thermococcus sp. JDF-3

<400> 8

Asp Phe Arg Ser Leu Tyr Leu Ser Ile Ile
1 5 10

<210> 9

<211> 10

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 9

Asp Phe Arg Ser His Tyr Pro Ser Ile Ile
1 5 10

<210> 10

<211> 10

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 10

Asp Phe Arg Ser Phe Tyr Pro Ser Ile Ile
1 5 10

<210> 11

<211> 30

<212> DNA

<213> Artificial/Unknown

<220>

<221> misc_feature

<222> ()..()

<223> Synthetic oligonucleotide PCR primer

<400> 11

gggaaacata tgatccttga cgttgattac

30

<210> 12

<211> 31

<212> DNA

<213> Artificial/Unknown

<220>

<221> misc_feature

<222> ()..()

<223> Synthetic oligonucleotide PCR primer

<400> 12

gggaaaaggat cctcacttct tcttcccctt c

31

<210> 13

<211> 34

<212> DNA

<213> Artificial/Unknown

<220>

<221> misc_feature

<222> ()..()

<223> Synthetic oligonucleotide primer

<400> 13
tcagatgaat tcgatgatcc ttgacgttga ttac 34

<210> 14
<211> 54
<212> DNA
<213> Artificial/Unknown

<220>
<221> misc_feature
<222> ()..()
<223> Synthetic oligonucleotide primer

<400> 14
gagagaattc ataatgataa ggaggaaaaa attatgatcc ttgacgttga ttac 54

<210> 15
<211> 31
<212> DNA
<213> Artificial/Unknown

<220>
<221> misc_feature
<222> ()..()
<223> Synthetic oligonucleotide primer

<400> 15
tcagatctcg agtcacttct tcttcccctt c 31

<210> 16
<211> 29
<212> DNA
<213> Artificial/Unknown

<220>
<221> misc_feature
<222> ()..()
<223> Synthetic oligonucleotide sequencing primer

<400> 16
ccagctttcc agactagtcg gccaaaggcc 29

<210> 17
<211> 16
<212> DNA
<213> Artificial/Unknown

<220>
<221> misc_feature
<222> ()..()
<223> Synthetic oligonucleotide sequencing primer

<400> 17
aactctcgac ccgctg 16

<210> 18
 <211> 37
 <212> DNA
 <213> Artificial/Unknown

<220>
 <221> misc_feature
 <222> ()..()
 <223> Synthetic oligonucleotide primer

<400> 18
 gggtttcccag tcacgacgtt gtaaaacgac ggccagt

37

<210> 19
 <211> 18
 <212> DNA
 <213> Artificial/Unknown

<220>
 <221> misc_feature
 <222> ()..()
 <223> First strand of synthetic oligonucleotide duplex

<400> 19
 taacgttggg ggggggca

18

<210> 20
 <211> 18
 <212> DNA
 <213> Artificial/Unknown

<220>
 <221> misc_feature
 <222> ()..()
 <223> Second strand of synthetic oligonucleotide duplex

<400> 20
 tgcaaccccc ccccgat

18

<210> 21
 <211> 139
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> UNSURE
 <222> (6)..(6)
 <223> X = unknown

<400> 21

Leu Val Cys Asn Ala Xaa Ser Thr Gly Asn Leu Val Glu Trp Phe Leu
 1 5 10 15

Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala Pro Asn Lys Pro Asp
 20 25 30

Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala Pro Asn Lys Pro
 20 25 30
 Asp Glu Arg Glu Leu Ala Arg Arg Arg Gly Gly Tyr Ala Gly Gly Tyr
 35 40 45
 Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile Val Tyr Leu Asp
 50 55 60
 Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His Asn Val Ser Pro
 65 70 75 80
 Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp Val Ala Pro Glu
 85 90 95
 Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu
 100 105 110
 Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile Lys Arg Lys Met Lys
 115 120 125
 Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp
 130 135 140

<210> 24
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 24

Val Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu Val Glu Trp Phe
 1 5 10 15
 Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala Pro Asn Lys Pro
 20 25 30
 Asp Glu Arg Glu Leu Ala Arg Arg Arg Gly Gly Tyr Ala Gly Gly Tyr
 35 40 45
 Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile Val Tyr Leu Asp
 50 55 60
 Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His Asn Val Ser Pro
 65 70 75 80
 Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp Val Ala Pro Glu
 85 90 95
 Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu
 100 105 110
 Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile Lys Met Lys Met Lys
 115 120 125
 Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp
 130 135 140

<210> 25
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 25

Val Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu Val Glu Trp Phe
 1 5 10 15
 Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala Pro Asn Lys Pro
 20 25 30
 Asp Glu Arg Glu Leu Ala Arg Arg Gly Gly Tyr Ala Gly Gly Tyr
 35 40 45
 Val Lys Glu Pro Glu Arg Gly Leu Trp Asp Asn Ile Val Tyr Leu Asp
 50 55 60
 Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His Asn Val Ser Pro
 65 70 75 80
 Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp Val Ala Pro Glu
 85 90 95
 Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu
 100 105 110
 Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile Lys Arg Lys Met Lys
 115 120 125
 Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp
 130 135 140

<210> 26
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> UNSURE
 <222> (5)..(5)
 <223> X = unknown

<400> 26

Val Trp Asp Val Xaa Arg Ser Ser Thr Gly Asn Leu Val Glu Trp Phe
 1 5 10 15
 Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala Pro Asn Lys Pro
 20 25 30
 Asp Glu Arg Glu Leu Ala Arg Arg Gly Gly Tyr Ala Gly Gly Tyr
 35 40 45
 Val Lys Glu Pro Glu Arg Gly Gln Trp Asp Asn Ile Ala Tyr Leu Asp
 50 55 60
 Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His Asn Val Ser Pro
 65 70 75 80
 Asp Thr Leu Lys Arg Glu Gly Cys Arg Ser Tyr Asp Val Ala Pro Glu
 85 90 95
 Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe Ile Pro Ser Leu
 100 105 110
 Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile Lys Arg Lys Met Lys
 115 120 125
 Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp

130 135 140

<210> 27
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 27

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Trp | Asp | Val | Pro | Arg | Ser | Ser | Thr | Gly | Asn | Leu | Val | Glu | Trp | Phe |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Glu | Leu | Ala | Pro | Asn | Lys | Pro |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala | Gly | Gly | Tyr |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Val | Lys | Glu | Pro | Glu | Arg | Gly | Leu | Trp | Asp | Asn | Ile | Val | Tyr | Leu | Asp |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Phe | Arg | Ser | Leu | Tyr | Pro | Ser | Ile | Ile | Ile | Thr | His | Asn | Val | Ser | Pro |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Asp | Thr | Leu | Asn | Arg | Glu | Gly | Cys | Arg | Ser | Tyr | Asp | Val | Ala | Pro | Glu |
| | | | 85 | | | | | | 90 | | | | | 95 | |
| Val | Gly | His | Lys | Phe | Cys | Lys | Asp | Phe | Pro | Gly | Phe | Ile | Pro | Ser | Leu |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Leu | Gly | Asn | Leu | Leu | Glu | Glu | Arg | Gln | Lys | Ile | Lys | Arg | Lys | Met | Lys |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | Leu | Leu | Asp | | | | |
| | 130 | | | | | 135 | | | | | 140 | | | | |

<210> 28
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> UNSURE
 <222> (92)..(92)
 <223> X = unknown

<400> 28

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Trp | Asp | Val | Ser | Arg | Ser | Ser | Thr | Gly | Asn | Leu | Val | Glu | Trp | Phe |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Glu | Leu | Ala | Pro | Asn | Lys | Pro |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala | Gly | Gly | Tyr |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Val | Lys | Glu | Pro | Glu | Arg | Gly | Leu | Trp | Asp | Asn | Ile | Val | Tyr | Leu | Asp |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Phe | Arg | Ser | Leu | Tyr | Pro | Ser | Ile | Ile | Ile | Thr | His | Asn | Val | Ser | Pro |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Asp | Thr | Leu | Asn | Arg | Glu | Gly | Cys | Arg | Ser | Tyr | Xaa | Val | Ala | Pro | Glu |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| | | | 85 | | | | | | 90 | | | | | 95 | | | |
| Val | Gly | His | Lys | Phe | Cys | Lys | Asp | Phe | Pro | Gly | Phe | Ile | Pro | Ser | Leu | | |
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| Leu | Gly | Asn | Leu | Leu | Glu | Glu | Arg | Gln | Lys | Ile | Lys | Arg | Lys | Met | Lys | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | Leu | Leu | Asp | | | | | | |
| | 130 | | | | | 135 | | | | | 140 | | | | | | |

<210> 29
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> UNSURE
 <222> (92)..(92)
 <223> X = Unknown

<400> 29

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Val | Trp | Asp | Val | Ser | Arg | Ser | Ser | Thr | Gly | Asn | Leu | Val | Glu | Trp | Phe | | |
| 1 | | | | 5 | | | | | 10 | | | | 15 | | | | |
| Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Glu | Leu | Ala | Pro | Asn | Lys | Pro | | |
| | | | 20 | | | | | 25 | | | | | 30 | | | | |
| Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala | Gly | Gly | Tyr | | |
| | | 35 | | | | | 40 | | | | | 45 | | | | | |
| Val | Lys | Glu | Pro | Glu | Arg | Gly | Pro | Trp | Asp | Asn | Ile | Val | Tyr | Leu | Asp | | |
| | 50 | | | | | 55 | | | | | 60 | | | | | | |
| Phe | Arg | Ser | Leu | Tyr | Pro | Ser | Ile | Ile | Ile | Thr | His | Asn | Val | Ser | Pro | | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | | |
| Asp | Thr | Leu | Asn | Arg | Glu | Gly | Cys | Arg | Ser | Tyr | Xaa | Val | Ala | Pro | Glu | | |
| | | | 85 | | | | | 90 | | | | | | 95 | | | |
| Val | Gly | His | Lys | Phe | Cys | Lys | Asp | Phe | Pro | Gly | Phe | Ile | Pro | Ser | Leu | | |
| | | | 100 | | | | | 105 | | | | | 110 | | | | |
| Leu | Gly | Asn | Leu | Leu | Glu | Val | Arg | Gln | Lys | Ile | Lys | Arg | Lys | Met | Lys | | |
| | | 115 | | | | | 120 | | | | | 125 | | | | | |
| Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | Leu | Leu | Asp | | | | | | |
| | 130 | | | | | 135 | | | | | 140 | | | | | | |

<210> 30
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 30

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Val | Trp | Asp | Val | Ser | Arg | Ser | Ser | Thr | Gly | Asn | Leu | Val | Glu | Trp | Phe | | |
| 1 | | | | 5 | | | | | 10 | | | | 15 | | | | |
| Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Lys | Leu | Ala | Pro | Asn | Lys | Pro | | |
| | | | 20 | | | | | 25 | | | | | 30 | | | | |
| Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala | Gly | Gly | Tyr | | |

| 35 | | | | | 40 | | | | | 45 | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Lys | Glu | Pro | Glu | Arg | Gly | Leu | Trp | Asp | Asn | Ile | Val | Tyr | Leu | Asp |
| 50 | | | | | | 55 | | | | | 60 | | | | |
| Phe | Arg | Ser | Leu | Tyr | Pro | Ser | Ile | Ile | Ile | Thr | His | Asn | Val | Ser | Pro |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Asp | Thr | Leu | Asn | Arg | Glu | Gly | Cys | Arg | Ser | Tyr | Asp | Val | Ala | Pro | Glu |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Val | Gly | His | Lys | Phe | Cys | Lys | Asp | Phe | Pro | Gly | Phe | Ile | Pro | Ser | Leu |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Leu | Gly | Asn | Leu | Leu | Glu | Glu | Arg | Gln | Lys | Ile | Lys | Arg | Lys | Met | Lys |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | Leu | Leu | Asp | | | | |
| | 130 | | | | | 135 | | | | | 140 | | | | |

<210> 31
 <211> 140
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> UNSURE
 <222> (4)..(4)
 <223> X = unknown

<220>
 <221> UNSURE
 <222> (6)..(6)
 <223> X = unknown

<400> 31

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Tyr | Trp | Ser | Xaa | Pro | Xaa | Leu | Arg | Thr | Gly | Asn | Leu | Val | Glu | Trp | Phe |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Glu | Leu | Ala | Pro | Asn | Lys | Pro |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala | Gly | Gly | Tyr |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Val | Lys | Glu | Pro | Glu | Arg | Gly | Leu | Trp | Asp | Asn | Ile | Val | Tyr | Leu | Asp |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Phe | Arg | Ser | Leu | Tyr | Pro | Ser | Ile | Ile | Ile | Thr | His | Asn | Val | Ser | Pro |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Asp | Thr | Leu | Asn | Arg | Glu | Gly | Cys | Arg | Ser | Tyr | Asp | Val | Ala | Pro | Glu |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Val | Gly | His | Lys | Phe | Cys | Lys | Asp | Phe | Pro | Gly | Phe | Ile | Pro | Ser | Leu |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Leu | Gly | Asn | Pro | Leu | Glu | Glu | Arg | Gln | Lys | Ile | Lys | Arg | Lys | Met | Lys |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | Leu | Leu | Asp | | | | |
| | 130 | | | | | 135 | | | | | 140 | | | | |

<210> 32
 <211> 141
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> Unsure
 <222> (5)..(5)
 <223> X = unknown

<400> 32

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Asp | Gly | Thr | Xaa | Pro | Arg | Ser | Ser | Thr | Gly | Asn | Leu | Val | Glu | Trp |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Phe | Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Glu | Leu | Ala | Pro | Asn | Lys |
| | | | 20 | | | | 25 | | | | | | 30 | | |
| Pro | Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala | Gly | Gly |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Tyr | Val | Lys | Glu | Pro | Glu | Arg | Gly | Leu | Trp | Asp | Asn | Ile | Val | Tyr | Leu |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Asp | Phe | Arg | Ser | His | Tyr | Pro | Ser | Ile | Ile | Ile | Thr | His | Asn | Val | Ser |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Pro | Asp | Thr | Leu | Asn | Arg | Glu | Gly | Cys | Arg | Ser | Tyr | Asp | Val | Ala | Pro |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Glu | Asp | Gly | His | Lys | Phe | Cys | Lys | Asp | Phe | Pro | Gly | Phe | Ile | Pro | Ser |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Leu | Leu | Gly | Asn | Leu | Leu | Glu | Glu | Arg | Gln | Lys | Ile | Lys | Arg | Lys | Met |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Lys | Ala | Thr | Leu | Asp | Pro | Leu | Glu | Lys | Asn | His | Leu | Asp | | | |
| | 130 | | | | | 135 | | | | | | 140 | | | |

<210> 33
 <211> 143
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> Unsure
 <222> (1)..(3)
 <223> X = unknown

<400> 33

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Xaa | Xaa | Xaa | Phe | Trp | Asp | Val | Ser | Arg | Ser | Ser | Thr | Gly | Asn | Leu | Val |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Glu | Trp | Phe | Leu | Leu | Arg | Lys | Ala | Tyr | Glu | Arg | Asn | Glu | Leu | Ala | Pro |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Asn | Lys | Pro | Asp | Glu | Arg | Glu | Leu | Ala | Arg | Arg | Arg | Gly | Gly | Tyr | Ala |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Gly | Gly | Tyr | Val | Lys | Glu | Pro | Glu | Arg | Gly | Leu | Trp | Asp | Asn | Ile | Val |
| | 50 | | | | | 55 | | | | | 60 | | | | |

Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His Asn
65 70 75 80

Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Arg Ser Tyr Asp Val
85 90 95

Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp Phe Pro Gly Phe Ile
100 105 110

Pro Ser Leu Leu Gly Asn Leu Leu Glu Glu Arg Gln Lys Ile Lys Arg
115 120 125

Lys Met Lys Ala Thr Leu Asp Pro Leu Glu Lys Asn Leu Leu Asp
130 135 140

<210> 34

<211> 180

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 34

Thr Gly Glu Gly Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala
1 5 10 15

Arg Val Thr Tyr Glu Leu Gly Arg Glu Phe Phe Pro Met Glu Ala Gln
20 25 30

Leu Ser Arg Leu Ile Gly Gln Gly Asp Trp Asp Val Ser Arg Ser Ser
35 40 45

Thr Gly Asn Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg
50 55 60

Asn Glu Leu Ala Pro Asn Lys Pro Asp Glu Arg Glu Leu Ala Arg Arg
65 70 75 80

Arg Gly Gly Tyr Ala Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu
85 90 95

Trp Asp Asn Ile Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile
100 105 110

Ile Ile Thr His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys
115 120 125

Arg Ser Tyr Asp Val Ala Pro Glu Val Gly His Lys Phe Cys Lys Asp
130 135 140

Phe Pro Gly Phe Ile Pro Ser Leu Leu Gly Asn Leu Leu Glu Glu Arg
145 150 155 160

Gln Lys Ile Lys Arg Lys Met Lys Ala Thr Leu Asp Pro Leu Glu Lys
165 170 175

Asn Leu Leu Asp
180

<210> 35

<211> 180

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 35

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
 1 5 10 15
 Cys Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Val Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Glu Lys Leu
 180

<210> 36
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 36

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
 1 5 10 15
 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110

Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Glu Glu Leu
 180

<210> 37
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 37

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
 1 5 10 15
 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Lys Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Glu Lys Leu
 180

<210> 38
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 38

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
 1 5 10 15
 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Lys Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Glu Lys Leu
 180

<210> 39
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 39

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Asn Tyr Tyr Gly Tyr
 1 5 10 15
 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu

| | | |
|---|-----|-----|
| 115 | 120 | 125 |
| Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala | | |
| 130 | 135 | 140 |
| Arg Val Leu Glu Ala Ile Leu Arg His Asp Asp Val Glu Glu Ala Val | | |
| 145 | 150 | 155 |
| Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro | | |
| 165 | 170 | 175 |
| Pro Glu Lys Leu | | |
| 180 | | |

<210> 40
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<220>
 <221> Unsure
 <222> (114)..(114)
 <223> X = Unknown

<400> 40

| | |
|---|-------------|
| Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr | |
| 1 | 5 10 15 |
| Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser | |
| 20 | 25 30 |
| Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu | |
| 35 | 40 45 |
| Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu | |
| 50 | 55 60 |
| His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala | |
| 65 | 70 75 80 |
| Met Glu Phe Leu Asn Tyr Ile Asn Leu Lys Leu Pro Gly Leu Leu Glu | |
| 85 | 90 95 |
| Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys | |
| 100 | 105 110 |
| Lys Xaa Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu | |
| 115 | 120 125 |
| Glu Ile Val Arg Arg Asp Trp Ser Lys Ile Ala Lys Glu Thr Gln Ala | |
| 130 | 135 140 |
| Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Ile | |
| 145 | 150 155 160 |
| Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro | |
| 165 | 170 175 |
| Pro Glu Lys Leu | |
| 180 | |

<210> 41
 <211> 180

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 41

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
1 5 10 15
Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
20 25 30
Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
35 40 45
Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
50 55 60
His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
65 70 75 80
Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
85 90 95
Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
100 105 110
Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Ala Thr Arg Gly Leu
115 120 125
Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
130 135 140
Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
145 150 155 160
Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
165 170 175
Pro Glu Lys Leu
180

<210> 42

<211> 180

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 42

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
1 5 10 15
Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
20 25 30
Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
35 40 45
Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
50 55 60
His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
65 70 75 80
Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
85 90 95

Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Asn Lys Tyr Glu Val Pro
 165 170 175
 Pro Glu Lys Leu
 180

<210> 43
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3
 <400> 43

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
 1 5 10 15
 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Glu Lys Leu
 180

<210> 44
 <211> 180
 <212> PRT

<213> Thermococcus sp. JDF-3

<400> 44

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
1 5 10 15
Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
20 25 30
Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
35 40 45
Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
50 55 60
His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
65 70 75 80
Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
85 90 95
Pro Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
100 105 110
Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
115 120 125
Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
130 135 140
Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
145 150 155 160
Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
165 170 175
Pro Glu Lys Leu
180

<210> 45

<211> 180

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 45

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
1 5 10 15
Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
20 25 30
Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
35 40 45
Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
50 55 60
His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
65 70 75 80
Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
85 90 95

Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Val Lys Leu
 180

<210> 46
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 46

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
 1 5 10 15
 Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
 20 25 30
 Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
 35 40 45
 Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
 50 55 60
 His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
 65 70 75 80
 Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
 85 90 95
 Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
 100 105 110
 Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
 115 120 125
 Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
 130 135 140
 Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
 145 150 155 160
 Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
 165 170 175
 Pro Gly Glu Ala
 180

<210> 47
 <211> 180
 <212> PRT
 <213> Thermococcus sp. JDF-3

<400> 47

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Asn
1 5 10 15
Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
20 25 30
Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
35 40 45
Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
50 55 60
His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
65 70 75 80
Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
85 90 95
Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys
100 105 110
Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
115 120 125
Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
130 135 140
Arg Val Leu Glu Ala Ile Leu Arg His Gly Asp Val Glu Glu Ala Val
145 150 155 160
Arg Ile Val Arg Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
165 170 175
Pro Glu Lys Leu
180

<210> 48

<211> 180

<212> PRT

<213> Thermococcus sp. JDF-3

<400> 48

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
1 5 10 15
Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Arg Glu Cys Ala Glu Ser
20 25 30
Val Thr Ala Trp Gly Arg Glu Tyr Ile Glu Met Val Ile Arg Glu Leu
35 40 45
Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ala Asp Thr Asp Gly Leu
50 55 60
His Ala Thr Ile Pro Gly Ala Asp Ala Glu Thr Val Lys Lys Lys Ala
65 70 75 80
Met Glu Phe Leu Asn Tyr Ile Asn Pro Lys Leu Pro Gly Leu Leu Glu
85 90 95
Leu Glu Tyr Glu Gly Phe Tyr Val Arg Gly Phe Phe Val Thr Lys Lys

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 100 | | | | | | | 105 | | | | | 110 | | | | |
| Lys | Tyr | Ala | Val | Ile | Asp | Glu | Glu | Gly | Lys | Ile | Thr | Thr | Arg | Gly | Leu | |
| 115 | | | | | | | 120 | | | | | 125 | | | | |
| Glu | Ile | Val | Arg | Arg | Asp | Trp | Ser | Glu | Ile | Ala | Lys | Glu | Thr | Gln | Ala | |
| 130 | | | | | | | 135 | | | | | 140 | | | | |
| Arg | Val | Leu | Glu | Ala | Ile | Leu | Arg | His | Gly | Asp | Val | Glu | Glu | Ala | Val | |
| 145 | | | | | | | 150 | | | | | 155 | | | | |
| Arg | Ile | Val | Arg | Glu | Val | Thr | Glu | Lys | Leu | Ser | Lys | Tyr | Glu | Val | Pro | |
| 165 | | | | | | | 170 | | | | | 175 | | | | |
| Pro | Glu | Lys | Leu | | | | | | | | | | | | | |
| 180 | | | | | | | | | | | | | | | | |